

GREEN AUDIT REPORT

2021-2022



VASANT KANYA MAHAVIDYALAYA
(Admitted to the Privileges of Banaras Hindu University)
KAMACHHA-221010
VARANASI



Prepared by

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VARANASI – 221005.

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Certificate

This is to certify that “Green Audit” for **Vasant Kanya Mahavidyalaya, Kamachha-221010, Varanasi** has been conducted in May 2022 to assess the environmental impact and green initiatives, planning and efforts made to implement them in the college campus based on institutional working framework. The Green initiatives carried out by the Institution was found to be satisfactory. The efforts taken by the management and faculty towards sustainable environment on-campus is appreciable.

Place: Varanasi
Date: 30th May, 2022


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Acknowledgement

Green Audit Assessment Team wishes to acknowledge the management of Vasant Kanya Mahavidyalaya for entrusting this important work on us. We appreciate the cooperation of the faculty and staff of the college for their help in data collection and information as and where required. Our special thanks to Prof. Rachna Srivastava, Principal, Vasant Kanya Mahavidyalaya and Prof. Indu Upadhyay, Co-ordinator, IQAC, Vasant Kanya Mahavidyalaya for giving us necessary inputs to carry out the vital yet comprehensive exercise of green audit.

Green Audit Team

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| | |
|---------------------------------|---|
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Disclaimer:

Green Audit Team has prepared this report of 2021-22 for Vasant Kanya Mahavidyalaya, Kamachha, Varanasi based upon the input data collected on site or provided by the representatives of college complemented with the best judgment capacity of the expert team. While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered. It is further informed that the calculations arrived at, are based on the best estimates and no representation, warranty or undertaking, expressed or implied are levied on the audit team. The Audit Team has no responsibility towards any direct or consequential loss arising from the use of any information, statements or projections in the report.

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Executive Summary

Educational institutions now a days are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco-friendly. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. The activities pursued by colleges can create a variety of adverse environmental impacts. The environmental assessment should be conducted in such a way that it provides, as specifically as possible, a baseline reference for future sustainability programming. Green audit is defined as an official examination of the effects a college has on the environment.

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. Green auditing and the implementation of mitigation measures is a win-win situation for all the college, the learners and the planet. It can also create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of green impact on campus. Green auditing promotes financial savings through reduction of resource use. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future.

In Vasant Kanya Mahavidyalaya, the audit process involved initial interviews with administration to clarify policies, activities, records and the co-operation of staff and students in the implementation of mitigation measures. This was followed by collection of data through the questionnaire, review of records, observation of practices and observable outcomes.

The baseline data prepared for the Vasant Kanya Mahavidyalaya, shall prove to be a useful tool for campus greening, resource management, planning of future projects and a document for ensuring sustainable development of the college. The data from the report will allow the college to compare its programmes and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. It is expected that the college administration will be committed to implement the green audit recommendations made by the team through its report.

This green audit report is submitted with the Vasant Kanya Mahavidyalaya authorities for its betterment in the years to come.

Best Wishes

Prof. Kavita Shah
Institute of Environment and Sustainable Development
Banaras Hindu University – 221005.

1. INTRODUCTION

About the Vasant Kanya Mahavidyalaya

Vasant Kanya Mahavidyalaya is situated within the premises of the Theosophical Society at Kamachha, Varanasi. Established in 1954, it is run by Besant Education Fellowship and is affiliated to Banaras Hindu University. The college is situated in heart of Varanasi with a campus area of 10436.83 Sq. Mtr. The college at present runs Ph.D., Post-graduate and Undergraduate courses in arts and social sciences as well as Diploma courses sanctioned by UGC. With the motto of ‘Education as Service’, the institution aims at providing quality education and ensuring an all-inclusive growth. It cherishes the theosophical idea of Universal Brotherhood of Humanity, without distinction of race, creed, sex, caste and colour. The college has been accredited “A” by NAAC in its second cycle of accreditation in 2017.

Table 1: Campus layout and map

| S.No. | Building Name | G.F. Area (Sq.Mtr.) | F.F. Area (Sq.Mtr.) | S.F. Area (Sq.Mtr.) | T.F. Area (Sq.Mtr.) | Roof Area (Sq.Mtr.) |
|---------------------------|---------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1. | Administrative Wing Block ‘A’ | 325.75 | 325.75 | - | - | 325.75 |
| 2. | Academic Wing Block ‘C’ | 411.61 | 411.61 | - | - | 411.61 |
| 3. | Annie Besant Academic Block – 1 | 354.86 | 354.86 | 354.86 | - | 354.86 |
| 4. | Annie Besant Academic Block – 2 | 192.81 | 192.81 | - | - | 192.81 |
| 5. | Library | 104.12 | 104.12 | - | - | 104.12 |
| 6. | Leela Sharma Block | 635.00 | 635.00 | 635.00 | 635.00 | 635.00 |
| 7. | Canteen | 97.85 | - | - | - | - |
| Total area | | 2122.00 | 2024.15 | 989.86 | 635.00 | 2024.15 |
| Total area covered | | | | 7795.16 | | |

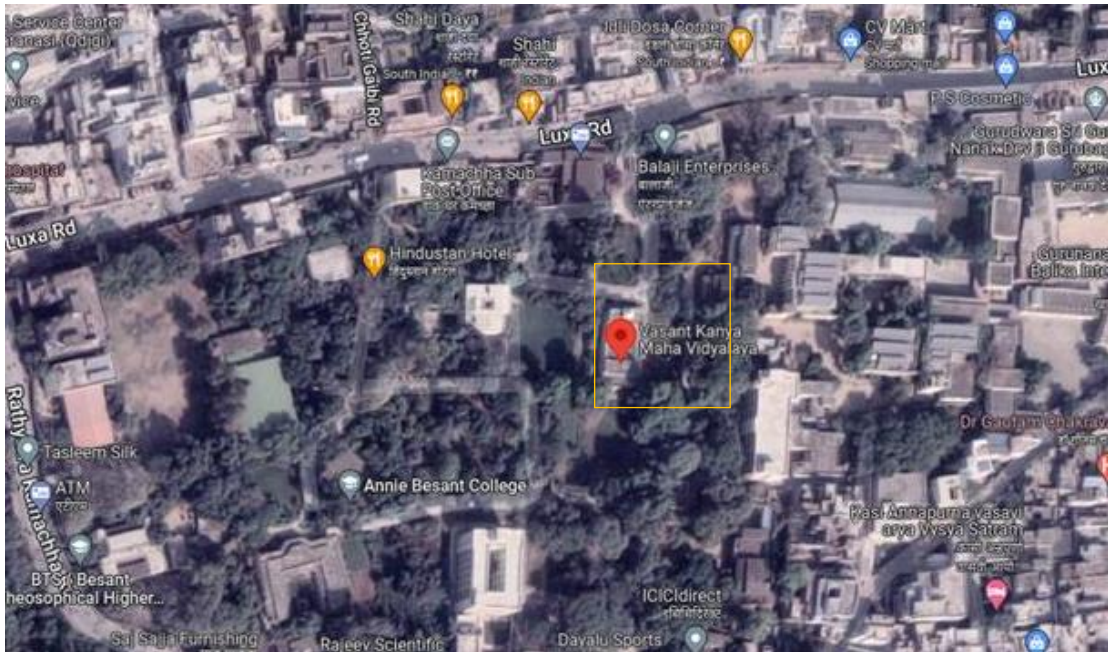


Figure 1: Satellite map showing location of Vasant Kanya Mahavidyalaya

Table 2: General Information About the College:

| A. General Information | |
|--------------------------------------|--|
| Name of the institution | Vasant Kanya Mahavidyalaya |
| Address | Kamachha, Varanasi |
| Contact Details | 0542-2455382, 09454329315 |
| Website | www.vkm.org.in |
| Location | Urban |
| B. Infrastructure | |
| Built up area (including others) | 3968.03 Sq.Mtr. {2122.00 Sq. Mtr (VKM)} |
| Campus area | 10436.83 Sq.Mtr. |
| Roof area | 2024.15 Sq.Mtr. |
| Open space (including greenery area) | 6468.83 Sq.Mtr. |
| Built up area (only VKM) | 7795.46 Sq.Mtr. |
| Greenery area | 2087.46 Sq.Mtr. |
| No. of auditorium - AC/Non-AC | 01 |
| Library | 01 |
| Laboratories | 02 |
| Pharmacy | Facility provided at the level of BHU |
| Playground | 04 |
| Students' hostels | No hostel available under the college, however facility for girls hostel provided by Theosophical Society |
| Canteen | 01 |
| Transport facilities | - |

C. Courses and Class duration

| | |
|---------------------------|--|
| Class duration | UG -3 years PG – 2 years Diploma in Spoken English – 6 months; Certificate in Spoken English – 1 year Certificate in Fashion Designing – 1 year Certificate in Self Realization through Theosophy– 6 months |
| Courses | UG – 15 PG – 11 Ph.D. – 5 Certificate – 3 Diploma – 1 |
| Total No. of working days | 280 days |

D. Human Resources

| | |
|---------------------------------|--|
| Total Staff | Teaching – 46 Honorary/Guest Faculty – 15 Non-Teaching – 39 |
| Total Student uptake 2021-22 | Intake – 3309 (UG & PG) Admitted – 2347 (UG, PG & PhD) |
| Teacher: Student Ratio | 1:38 |
| Girl Student: Boy Student Ratio | VKM is a Women’s College In UG & PG, only girls are admitted In Ph.D., there are 14 male students (168:1) |

2. NEED FOR GREEN AUDIT

As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher education institutions in environmental sustainability becomes more pertinent. Green Audit is a process of systematic identification, quantification, recording, reporting, and determining whether institutional practices are eco-friendly and sustainable. It aims to analyse environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit is a useful ecological tool and official examination for a college to determine how and where they are in using the natural resources as energy or water, in view of which the college can consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for recycling project or to improve waste minimization. It allows the college to evaluate its own contributions towards a sustainable future.

The rapid urbanization and economic development at local, regional, and global level have led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric carbon-di-oxide from the environment. In recent times, the Green Audit of an institution has become of paramount importance for self-assessment of the institution which reflects its the role in mitigating the present environmental problems. VKM is committed to responsible stewardship of resources and to demonstrate leadership in sustainable academic practices. The college supports the climate neutrality goals as outlined by the Government of India and monitors the sustainability of the research and education mission through the Green Audit of its campus.

2.1 NAAC CRITERIA VII ENVIRONMENTAL CONSCIOUSNESS

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory for Higher Education Institutions to have an annual Green Audit Report under Criterion VII of NAAC. Moreover, it is part of Corporate Social Responsibility of the Higher Education Institutions to ensure that they contribute towards the reduction of global warming by taking measures to minimize their Carbon Footprint. Green Audit thus intends to upgrade the environmental condition inside and around the institution.

3. OBJECTIVES OF GREEN AUDIT

1. Assessment of water and soil quality in the VKM campus.
2. Quantification and management of the solid and liquid waste generated on campus
3. To prepare a list of green practices adopted by the college and assess their performances on a yearly basis.
4. To provide a database for corrective actions and future development plans.
5. To identify the gaps and give recommendations to improve the Green Campus status of VKM.

4. AUDIT METHODOLOGY

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable.

The present Green Audit of the Institution comprises of the following stages:

I. Pre-Audit Stage:

It involves the identification of target areas for auditing.

II. Audit Stage:

Collection and collation of onsite data were made through:

1. Review of previous records and policies
2. Onsite physical inspection of the campus
3. Interaction with the stakeholders
4. Collection of data and observation
5. Focus Group Discussion

III. Post-Audit Stage

It includes the data analysis, preparation of the final report, and recommendations to overcome the flaws and to keep a watch on the action plan.

4.1 MAJOR AREAS OF AUDIT REPORT

For Green Audit the following 5 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

- (i) Water Audit and its Management
- (ii) Energy Audit and its Management
- (iii) Waste Audit and its Management
- (iv) Carbon Footprint
- (v) Green Campus Management

5. WATER AUDIT AND ITS MANAGEMENT

Water Audit can be defined as a qualitative and quantitative analysis of water consumption to identify the means of reducing, reusing and recycling water. Water auditing is conducted to evaluate the quality, availability and usage of water; the facilities available and methods adopted to revitalize and use it so that the resources are intact without leading to deterioration. As per the standards provided by National Building Code of India, 2016 Bureau of Indian Standards (NBC, 2016 BIS) water requirement for higher educational institute is 45L per capita.

The major water source in the campus is ground water. The college has 4 borewell in the campus out of which 3 are in working condition and are being used for water withdrawal. The daily water consumption by the students and staff of the college when in full strength and operational is 45 KL per day. In the campus water is largely used for drinking, toilets, office, canteen, garden and laboratory. The organisation does not have any automatic leak detection system however, all the leakages are prevented by manual observation and through regular maintenance of pipelines. No leakage of water from pipes was observed by the auditing team.

Storage of water is in 2 overhead tanks, each with capacity of 25KL of which 10KL capacity is reserved for use in firefighting system. Water from overhead tanks is then distributed to washrooms, basins, laboratory and water purifiers/ coolers installed in the college building. Water coolers fitted with RO purifiers are provided in each building in the campus as a source of safe drinking water. Third party contractor is appointed by the College for their annual maintenance.

Wastewater Management:

- Wastewater is mainly generated from washings, toilet flushing, canteen kitchen and washroom on each floor of all the buildings.
- Currently, sanitary wastewater generated is sent to municipal sewer line.

**Table 3: Average water consumption by the staff and students of Vasant Kanya Mahavidyalaya from June 2021 – May 2022 as per NBC, 2016 BIS Report.
Per capita water consumption 45 liters /day**

| S.No. | Category | No. of individuals | Total water consumed (liters per day) |
|--------------|--------------|--------------------|---------------------------------------|
| 1. | Day Scholars | 3309 | 148905 |
| 2. | Staff | 100 | 4500 |
| Total | | 3409 | 153405 |

Water Conservation Initiatives:

1. No leakage of water from faucets and pipes were noticed by the audit team.
2. Collection of water dripping from Air Conditioners in the college in buckets and used for watering plants in garden area on campus.
3. Reuse of the effluents of the Home Science Laboratory by channelling for gardening purposes.
4. Rainwater harvesting is in place in the campus (under the scheme of Uttar Pradesh Government), which strengthens the water supply to the campus and maintains water level of wells through ground water recharging process. The rainwater is collected from the terraces of the 2 blocks and taken through pipes to the underground reservoir.

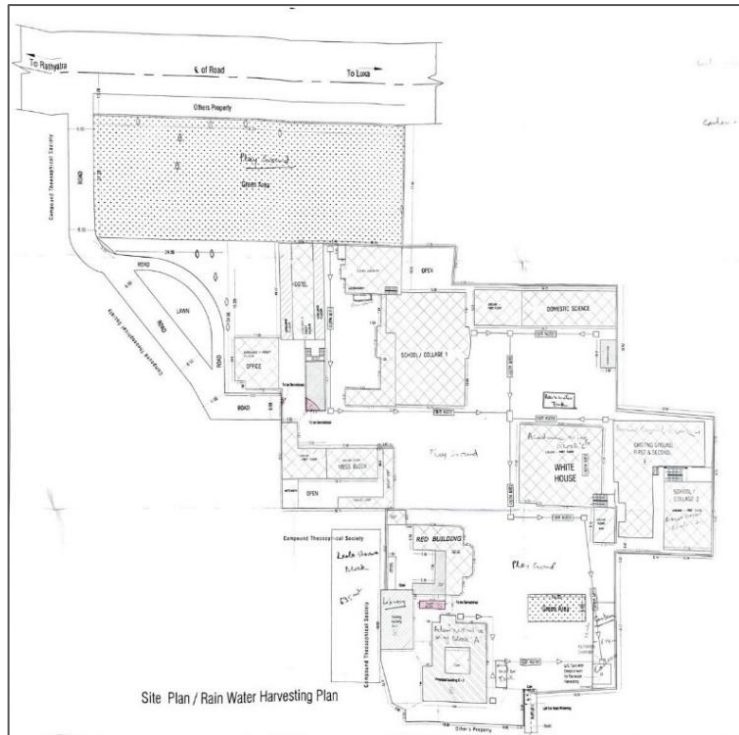


Figure 2: Rainwater harvesting plan in the college premises



Figure 3: Rainwater harvesting in places on the college premises

6. ENERGY AUDIT AND ITS MANAGEMENT

The energy audit is key to a systematic approach for decision making in the area of energy management. The major consumption of electricity by the college include the electrical equipment listed in table 4.

Table 4: Major consumption of electricity by the VKM

| | |
|--------------------------------------|---|
| Lights | 522 |
| LED bulbs and tubes | 522 |
| Fans (ceiling + standing) | 326 |
| Computers and laptops | 70 Desktop; 5 Laptops |
| Television | 1 |
| Projectors | 10 |
| CCTV cameras | 7 |
| Photocopiers | 03 |
| Air Conditioners | 7 Pcs. (5 Pcs. – 2 Ton; 2 Pcs. – 1.5 Ton) |
| Air Coolers | 7 |
| Water Pumps | 4 Pcs. (1 Pcs. – 3 HP 2 Pcs. – 1.5 HP 1 Pcs. – 0.5 HP) |
| Refrigerators | 5 Pcs. (4 Pcs. – 185 L; 1 Pcs. – 300 L) |
| Campus lights | 12 |
| Aquaguard water filters and coolers | 5 Pcs. Aquaguard with Water Cooler 1 Pcs. Kent RO 1 Pcs. Aquaguard Water Purifier cum Water Cooler |
| Genset available and capacity | Diesel genset - 2 Pcs. (30 KVA each) |
| <i>Laboratory Instruments</i> | |
| Portable Tachistoscope PT-123 | 02 |
| Human Maze (electric) | 20 |
| Memory Drum Electric | 06 |
| Printer | 3 |
| UPS | 01 |

| | |
|-------------------------|----|
| Electric Sewing Machine | 11 |
| Tracing Table | 01 |
| Press | 03 |
| OTG | 01 |
| Microwave | 01 |
| Mixer grinder | 01 |
| Sandwich toaster | 1 |
| Slice Toaster | 1 |
| Laundry Meter | 1 |
| Bath Machines | 2 |
| Electric kettle | 1 |
| Food Processor | 1 |
| Object Camera | 1 |

Energy sources utilized by all the departments and services of college include electricity. The average electricity consumption from June 2021 to May 2022 is 2597 KWH amounting to ₹ 25,411.17 @ ₹9.81 per unit. Electricity peak load is in the month of April 2022. All the Electricity is supplied through “The Indian Section, The Theosophical Society”. The major use of the energy is at administrative building, academic buildings, Library, and canteen. In addition to this, there are two sound free diesel generator (DG sets) of 30 KVA capacity each installed for meeting the energy requirements during power cuts. From June 2021 to May 2022, the average monthly consumption of diesel by the DG sets is 38.054 litre. Conventional tube lights, LEDs and fans are installed in classrooms, halls and library. For efficient energy consumption and savings on electric bill, the college has initiated the process of replacing incandescent bulbs and tube lights with LEDs.

For the year 2021-2022, the LPG cylinder consumption is approximately 5 cylinder per month for the Department of Home Science. Also, 5 LPG cylinders per month are used in canteen kitchen for cooking.



Figure 4: DG sets for electricity backup

Table 5: Electricity consumption at VKM campus

| Electricity load (June, 2021 to May, 2022) | | | | | | | | | | | | |
|--|----------------------|---------------------------|--------------------------------------|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|
| Months | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
| Average Daily Energy Usage (kWh) | 1144/30=38.12 | 1915/31=61.77 | 2313/31=74.61 | 2916/30=97.20 | 1889/31=60.92 | 1519/30=50.63 | 1930/31=62.24 | 2080/31=67.10 | 1730/28=61.79 | 2979/31=96.08 | 3100/30=103.33 | 2273/31=73.32 |
| Months with peak load | April | | | | | | | | | | | |
| Average Electricity Usage | | | | | | | | | | | | |
| Month | Units Consumed (KWH) | Bill Amount (₹) Unit@9.81 | Deduction for solar energy injection | Total Amount (MonthlyAverage) – ₹ 25411.17 | | | | | | | | |
| June 2021 | 1535.00 | 15058.00 | - | Total Units (Monthly Average) – 2597 KWH | | | | | | | | |
| July 2021 | 2411.00 | 23652.00 | - | | | | | | | | | |
| Aug 2021 | 2557.00 | 25084.00 | - | | | | | | | | | |
| Sept 2021 | 3562.00 | 34943.00 | - | | | | | | | | | |
| Oct 2021 | 1510.00 | 14813.00 | - | | | | | | | | | |
| Nov 2021 | 1693.00 | 16608.00 | - | | | | | | | | | |
| Dec 2021 | 1981.00 | 18649.00 | - | | | | | | | | | |
| Jan 2022 | 2100.00 | 20601.00 | - | | | | | | | | | |
| Feb 2022 | 1855.00 | 18198.00 | - | | | | | | | | | |
| Mar 2022 | 3887.00 | 38132.00 | - | | | | | | | | | |
| Apr 2022 | 4721.00 | 46313.00 | - | | | | | | | | | |
| May 2022 | 3352.00 | 32883.00 | - | | | | | | | | | |

(Source: Electricity bill of the campus)

Electricity Conservation Initiative:

1. **Centralized Solar Panels:** A 100KVA Photovoltaic Array has been installed on roof top of the college building which have been connected to the 600VA solar panel inverter. This is used in the lighting of the campus. This is the step forward for energy conservation reducing thereby the electricity consumption by the college.



Figure 5: Rooftop Solar Panels

2. **Signages:** The college campus has signages reminding people to turn off the light and fans in the rooms and laboratories.
3. **Energy efficient appliances:** The electrical appliances used in the college are star rated equipment which saves energy such as LED Bulbs, 3-4 star rated air conditioners and refrigerators.



Figure 6: Energy saving 3-star AC installed in the Hall

4. **Fuel Energy Audit:** The fuel energy audit determines the approximate use of petrol or diesel by the vehicles inside the College. It also includes the efforts taken by the college to conserve the fuel. The conventional source of fuel for the vehicle is petrol and diesel. Maximum students, teaching and non-teaching staff of college and visitors use two-wheeler and four-wheeler vehicles. Number of four wheelers is 12 and they consume 2100 litres of fuel/month whereas 100 are two wheelers and they consume 24,000 litres of fuel/month.

Details of Energy Audit are given in table 6 below.

Table 6: Fuel Energy Audit

| | | |
|----|--|---|
| 1. | Total number of Students | 2347 |
| 2. | Total number of Teachers | 61 |
| 3. | Number of non-teaching staff | 39 |
| 4. | Total number of vehicles used by the stakeholders of the college (per day) | 500 (approx.) |
| 5. | No. of cycles used | 350 |
| 6. | No. of two wheelers used (average distance travelled and quantity of fuel and amount used per day) | 100 (8 km/vehicle /day and 0.30 litre of fuel/vehicle /day) |
| 7. | No. of cars used (average distance travelled and | 12 (10 km/vehicle |

| | | |
|-----|---|---|
| | quantity of fuel and amount used per day) | /day and 0.58 litre of fuel/vehicle /day) |
| 8. | No. of persons using common (public) transportation (average distance travelled and quantity of fuel and amount used per day) | 1400 approx. (8km per day) |
| 9. | No. of parent-teacher meetings in a year? Parent turn up (approx.) | 2 200 (approx.) |
| 10. | No. of visitors with vehicles per day | 10 |
| 11. | No. of generators used every day (hours). Give the amount of fuel used per day | 02 generators 1 hour approx. 1.5 litre diesel |
| 12. | No. of LPG cylinders used in the canteen in a year | 29 |

5. **Fire Fighting System:** Seven (07) fire extinguishers (ABC MAP 90 type) are placed at VKM. In the newly constructed Leela Sharma block a fire hydrant system is installed. A 10KL of water in tank at the rooftop is reserved for the firefighting unit.

Table 7: Fire Safety Audit

| | |
|--|---|
| Firefighting systems in main campus Details | Fire Hydrant System (Complete Fire Fight System) installed in the Leela Sharma Block |
| Fire extinguishers installed and their types | 7 Pcs. (ABC - MAP 90) |
| Fire exists | 2 |



Figure 7: ABC-MAP 90 type Fire Extinguisher installed at each floor of the campus building



Figure 8: Fire Fighting System installed in Leela Sharma Block of VKM

7. CARBON FOOTPRINT

The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Among these greenhouse gases, carbon dioxide is the most prominent one, comprising of 416 ppm of the Earth's atmosphere. Each human being is contributing towards adding green-house gases to the atmosphere depending upon his day-to-day activities and usage of instruments and machineries for different purpose. A carbon footprint is the total sum of carbon dioxide emissions released into the Earth's atmosphere through by an organization, event, product, or a person.

An understanding about the same of any institute where large number of anthropogenic activities are happening is important to assess the contribution of emission of gases that are responsible for Green House Effect. Auditing for carbon footprint of VKM Campus was done using a detailed questionnaire, so that the impact of the community on environment can be assessed.

There are some standards and guidelines to measure GHG emissions like GHG protocol, ISO 14064, the more comprehensive one Life Cycle Assessment (LCA), market-based mechanisms like Clean Development Mission (CDM), and Voluntary Carbon Standards (VCS), etc. Out of them, ISO 14064 is an offset protocol and independent, voluntary GHG project accounting standard helps to quantify GHG emission of the organization, event, product, or person. From the provided data of annual electricity bill, annual fuel and LPG consumption of VKM College, the carbon footprint is calculated by multiplication with their emission factor which is about 46.77 tonnes CO₂ annually and a small part of it is compensated by remedial measures adopted by the college which is 2.29 tonnes CO₂ annually. Therefore, the effective carbon footprint from June 2021 to July 2022 is 44.48 Tonnes CO₂.

Table 8: Carbon Footprint Calculation for VKM for 2021-2022

| S. No. | Source | Rate | Quantity Days/ Year | Total Quantity | Annual Equivalent CO ₂ |
|--------------|----------------------------|-----------------------------|--|----------------|-----------------------------------|
| 1. | Electricity | 0.82 kgCO ₂ /kWh | 25411.17kWh/month × 12 | 20837.16 kWh | 20.84 T CO ₂ |
| 2. | Fossil fuel (LPG Cylinder) | 1.9 kgCO ₂ /kWh | (19 kg × 2 cylinders × 12) + (19 kg × 5 cylinders) | 0.551 T | 1.05 T CO ₂ |
| 3. | Fossil fuel (2-wheeler) | 2.3 kgCO ₂ eq/L | 30 liter/day × 280 days | 8.4kL | 19.32 T CO ₂ |
| 4. | Fossil fuel (Cars) | 2.3 kgCO ₂ eq/L | 7 liter/day × 300 days | 1.96kL | 4.51 T CO ₂ |
| 5. | Fossil fuel (DG Set) | 2.3 kgCO ₂ eq/L | 38.05 liter/day × 12 months | 0.457kL | 1.05 T CO ₂ |
| Total | | | | | 46.77 T CO₂ |

No. of activite days in 2021-22: 280 days

Table 9: Remediation for Carbon Footprint for VKM for 2021-2022

| S. No. | Source | Rate | Quantity Days/ Year | Total Quantity | Annual Equivalent CO ₂ |
|--------------|-------------------|-----------------------------|------------------------------|----------------|-----------------------------------|
| 1. | Solar Electricity | 0.82 kgCO ₂ /kWh | 100 kWh/Month × 12 | 1200 kWh | 0.98 T CO ₂ |
| 2. | Cycles | 2.68 kg/L | 350 cycles × 280 days/50 × 4 | 0.49 T | 1.31 T CO ₂ |
| Total | | | | | 2.29T CO₂ |

The International Organization for Standardization (ISO) also provides some general standards for

- Greenhouse gas emissions at Organization level (ISO 14064 - 1) and
- Greenhouse gas emissions at project level (ISO 14064 – 2)

Specifications to validate and verify relevant accountings are documented in (ISO 14064 - 3)

8. WASTE AUDIT AND ITS MANAGEMENT

Pollution from waste is aesthetically displeasing and results in large amounts of litter in our communities which can cause health problems. Solid waste is the unwanted or useless solid material generated from all sorts of daily activities. Solid waste management averts the adverse impacts on the environment and human health.

Waste generation on campus

The solid waste data from the VKM was collected from all the buildings along with support services. Different kinds of solid waste including paper wastes, canteen wastes, plastic wastes and e-wastes are generated in the campus. These solid wastes have been classified into two categories- biodegradable and non-biodegradable. Waste bins were provided on each floor, in staff rooms, laboratories, washrooms, kitchen and in campus area. Liquid waste generation from the two labs (psychology and home science) has also been recorded. No issues regarding municipal dump yard, garbage heap, sewer line, open drainage, etc in the near vicinity of the campus were recorded.



Figure 9: Waste-bins at different locations in the college premise

Biodegradable wastes

Bio-degradable wastes comprising of food wastes, canteen waste, and other organic wastes are added to a compost pit that is dug out. The organic wastes filled in the pits are subjected to composting which forms a best practice in the campus. In addition to the organic waste generated from different units, large sources of organic wastes other than kitchen wastes (college canteen, etc) like leave litter, terrestrial weeds etc that are generated from maintain and cleaning the campus are also added to the compost pit. All the paper waste generated from the classrooms, libraries, offices, etc is collected and sold out to the scrap dealers. Human waste is disposed via sewage pipes of the municipal corporation. Dustbins are installed in good numbers in all the buildings of the college to avoid littering.

Non-biodegradable waste

Non-biodegradable waste consisting of e-waste is weeded out by the college weed-out committee on the regular basis and given to the scrap-dealers who further re-cycle the waste. Remaining non-biodegradable wastes including plastic wastes, glass wastes, unused equipment and sanitary napkins are disposed off with the help of the municipal department.

Liquid waste disposal

Liquid waste generated from home science lab is used to water the flower beds that is situated just outside the lab area. The manure from the compost is used to fertilize these plantations as well.

Hazardous waste

There is no generation of any hazardous waste in the college.

9. GREEN CAMPUS MANAGEMENT

Water Quality Assessment

Water samples from three different borewell which are the main water source of the college campus were collected and analysed for its physicochemical parameters. The samples were collected, preserved and transported to the laboratory and analysed for various physio-chemical parameters. The major parameters analysed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. The results are presented in the table 10 below. The results are comparable with the values of drinking water standards prescribed by different agencies.

Table 10: Physicochemical parameters of water samples

| S.No. | Parameters | Sample1 | Sample 2 | Sample 3 | Standard value (BIS) |
|-------|------------------------------|---------|----------|----------|----------------------|
| 1. | pH | 7.6 | 7.3 | 7.6 | 6.5-8.5 |
| 2. | Total Dissolved Solids (ppm) | 630 | 620 | 630 | 500 |
| 3. | Dissolved Oxygen (mg/l) | 6.72 | 6.4 | 7.3 | 6-8 |
| 4. | Turbidity | Nil | Nil | Nil | 1 NTU |
| 5. | Conductivity (μ s) | 150 | 101 | 145 | - |
| 6. | Acidity (mg/l) | 35 | 25 | 35 | 200 |
| 7. | Alkalinity (mg/l) | 18 | 25 | 20 | 200 |
| 8. | Salinity (ppt) | 0.78 | 0.68 | 0.72 | - |
| 9. | Hardness (Total) | 165 | 167 | 163 | 200 |
| 10. | Total coliform | Nil | Nil | Nil | 0 |
| 11. | Fecal coliform | Nil | Nil | Nil | 0 |

Soil Quality Assessment

Soil samples were collected from two different locations of the campus and analysed for the basic parameters. The results are tabulated and presented in the table 11 below.

Table 11: Soil Quality Assessment

| S. No. | Parameter | Location 1 (Garden) | Location 2 (Ground) |
|--------|---------------------------------|---------------------|---------------------|
| 1. | pH | 7.4 | 7.0 |
| 2. | Total Kjeldhal Nitrogen (mg/kg) | 2.8 | 2.7 |
| 3. | Total organic carbon (%) | 1.5 | 1.2 |
| 4. | Phosphate (mg/kg) | 0.3 | 0.2 |

Air Quality Assessment

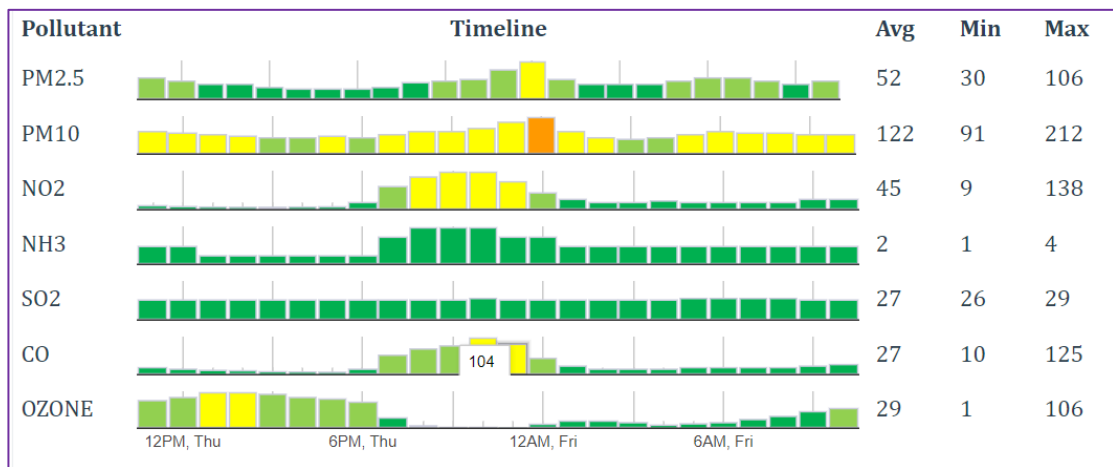


Figure 10: Concentration of air pollutant on the day of audit (20/05/2022)

Moderate

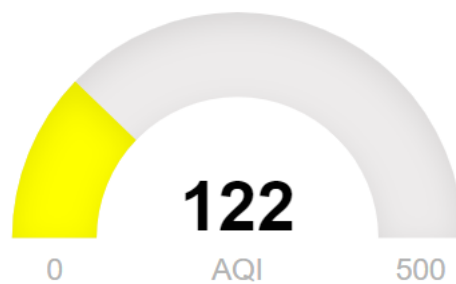


Figure 11: Air Quality Index on the audit day

Green cover

VKM garden is highly biodiverse and contains almost 100 species of plants, shrubs and trees. The garden area is spread in about 2087.46 sq.mtr., where students spend their free time during lunch and for reading books during lecture break. The college campus is divided into 4 blocks A, B, C, D and theosophical society area. All the

blocks are full of greenery having diverse type of plant species, comprising mainly of ornamental plants and fruit bearing plants. Every year the college organizes 2 plantation campaign for the students. The first plantation drive of the year is conducted during the month of July as “Varsha Mangal” program and later on a 7 days NSS camp is conducted in which an average 100 plants are planted by the students altogether. College does not have separate botanical, medicinal and vegetable garden. All the plants are randomly planted in the college premise and scientific names are not displayed. A small patch of mango and jackfruits trees are present in the theosophical society premise. Irrigation is performed mainly by groundwater borewell and by overflow water from the rooftop. The stakeholders in-charge of the garden area informed that instead of chemical fertilizers and pesticides, organic manures are used which is prepared from the compost pit of the college. The garden area also conserves rare and threatened species of plants, *Santalum album* (Chandan) in the college premises.

Green Initiatives by the College

1. Tree plantation

From time to time, College organizes programmes to spread awareness about environmental issues. NSS programmes focus on tree plantations wherein volunteers encourage people to plant new trees. All the five units of NSS conduct cleanliness drives in the college campus and classrooms. VESS India in collaboration with the Go Green Committee of the college planted 20 plants in the college campus on 29.07.2022. The plants were of mango, jamun, arjun and lemon. The programme was a part of a plantation drive of two months. The target of the drive was to plant 550 saplings across the city.

The College has registered itself in the Unnat Bharat Abhiyan in March 2018, a programme launched by the Ministry of Human Resources Development (MHRD) for enabling the villages in India to achieve sustainable development and better quality of life. The College has adopted 5 villages to conduct the programme - Badagaon, Khushipur, Kukaraha, Badiasanpur and Paharigaon. The students carry an awareness programme among the villagers about environment conservation, non-use of polythene bags and evils of excessive use of mobile.

2. Annual village camp

UBA is an ambitious outreach programme launched by Ministry of Human Resource Development in 2014. Vasant Kanya Mahavidyalaya joined the programme in 2018 and since then has been making significant contributions in uplifting and empowering the village life. The UBA Cell of VKM conducted the following programmes during the session 2021-2022:-

- An e-lecture was organized on the occasion of International Literacy Day, 14 September, 2021, on Right to Education: Revisiting Achievements and Examining Gaps". Prof. Madhu Kushwaha, Dept of Education, BHU was the invited speaker in this programme.
- An e-lecture was organized on "Participatory Rural Appraisal" on 08-10-2021 in which Dr. Alok Kumar Pandey, Assistant Professor, Centre for Integrated Rural Development, BHU shared his views with the participants.
- The Co-ordinator of UBA Cell, VKM, participated in an Orientation Programme conducted by RCI, IIT-BHU on 23.03.2022 in the Annie Besant Hall, IIT, BHU.
- Students of VKM under the aegis of UBA Cell participated in a poster and video making competition on the topic "Azadi ka Amrit Mahotsav: Unnat

Bharat Abhiyan ke Sath”, jointly organized by the Ministry of HRD and RCI, IIT, BHU.

3. Eco-club

The college has a Go-Green Committee which takes care of the greenery in the college campus. A trained gardener takes good care of gardening and plantation. Medicinal and fruit bearing plants are grown at various points in the college and flowering plants are grown in pots to beautify the campus. Additionally, the waste shell of coconut are being reused to make boundaries of plants instead of bricks.



Figure 12: Minimising the usage of bricks by reusing waste coconut shells in gardening.

4. Plastic free campaign

The college campus is declared as no polythene zone. Signage for promoting no polythene zone has been put up in the college premises.



Figure 13: Initiatives taken to promote plastic free campus

- The bio-degradable waste is regularly buried in the earth. It not only supports carbon-neutrality but also produces excellent manure for plants.
- Non-biodegradable waste including e-waste is weeded out by the college weed-out committee and given to the scrap-dealers who re-cycle the waste.

Flora in the VKM campus:

The campus of Theosophical society and VKM is rich in biodiversity. The campus boasts of 89 species of flora in the campus which are listed in the table 12.

Table 12: Flora in the VKM campus

| S. No. | Name | Botanical Name | Category | Quantity |
|---------------|-----------------------|-----------------------------|-----------------|-----------------|
| 1. | Adenium (desertroses) | <i>Adenium</i> | Tree | 02 |
| 2. | Alchornea | <i>Alchornea cordifolia</i> | | 12 |
| 3. | Allamanda | <i>Allamanda cathartica</i> | Shrub | 01 |
| 4. | AlmondTree | <i>Prunus dulcis</i> | Tree | 01 |
| 5. | Alpinia | <i>Alpinia galanga</i> | Herb | 08 |
| 6. | Amaltas | <i>Cassia fistula</i> | Tree | 01 |
| 7. | Anjeer | <i>Ficus carica</i> | Tree | 02 |
| 8. | Areca Palm | <i>Dyopsis lutescens</i> | Tree | 04 |
| 9. | Ashok | <i>Saraca indica Linn</i> | Tree | 18 |

| | | | | |
|-----|-------------------|---------------------------------------|-------|-------|
| 10. | Ashoka | <i>Polyalthia longifolium</i> | Tree | 15 |
| 11. | Bamboo | <i>Bambusoideae</i> | Grass | 02 |
| 12. | BananaPalm | <i>Musa</i> | Tree | 01 |
| 13. | Begonia'Vista | <i>King begonia</i> | Tree | 01 |
| 14. | Bela (Mogra) | <i>Jasminum sambac</i> | Shrub | 02 |
| 15. | Bottle Palm | <i>Hyophorb eleganicaulis</i> | Tree | 03 |
| 16. | Bottlebrushes | <i>Callistemon citrinus</i> | Tree | 05 |
| 17. | Cat Palm | <i>Chamaedorea cataractum</i> | Tree | 02 |
| 18. | Champa | <i>Michelia</i> | Shrub | 05 |
| 19. | Chandan | <i>Santalum album</i> | Tree | 01 |
| 20. | Chandni | <i>Tabernalmontana divaricata</i> | Shrub | 02 |
| 21. | China Palm | <i>Liustona chinensis</i> | Tree | 05 |
| 22. | Christmas Tree | <i>Araucaria hetrophylla</i> | Tree | 05 |
| 23. | Coleus | <i>Coleus</i> | Shrub | 01 |
| 24. | Croton | <i>Codiaeum variegatum</i> | Shrub | 07 |
| 25. | Crown-of-thorns | <i>Euphorbia milii</i> | Shrub | 04 |
| 26. | Cycas Zamia | <i>Zamia</i> | Shrub | 01 |
| 27. | Dabal Bonchi | | | 13 |
| 28. | Dahlia | <i>Dahlia</i> | Herb | 08 |
| 29. | Dracaena | <i>Dracaena fragrans</i> | Shrub | 05 |
| 30. | Dracaena Reflexa | <i>Dracaena reflexa</i> | Shrub | 01 |
| 31. | Dumb Cane Plant | <i>Dieffenbachia bowmannii</i> | Herb | 01 |
| 32. | Duranta | <i>Duranta erecta</i> | Shrub | Hedge |
| 33. | FanPalm | <i>Livistona chinensis</i> | Tree | 04 |
| 34. | Fern | <i>Tracheophyta</i> | Fern | 02 |
| 35. | Fig (Anjeer) | <i>Ficus carica</i> | Tree | 02 |
| 36. | Fishtail Palm | <i>Caryota</i> | Tree | 09 |
| 37. | Forbia | | | 04 |
| 38. | Gandhraj | <i>Gardenia jasminoides</i> | Shrub | 01 |
| 39. | Giant Bamboo | <i>Dendrocalamus giganteus</i> | Grass | 01 |
| 40. | Guava Plant | <i>Psidium guajava</i> | Tree | 02 |
| 41. | Gudhal | <i>Hibiscus</i> | Shrub | 11 |
| 42. | Guldaudi | <i>Chrysanthemum</i> | Herb | 02 |
| 43. | Henna | <i>Lauesonia inermis</i> | Tree | 01 |
| 44. | Hibiscus | <i>Malvaviscus</i> | Shrub | 03 |
| 45. | Ixora | <i>Ixora coccinea</i> | Shrub | 01 |
| 46. | Jackfruit Tree | <i>Artocarpus heterophyllus</i> | Tree | 03 |
| 47. | Jasmine | <i>Tabernaemontana divaricata</i> | Tree | 09 |
| 48. | Kachnar tree | <i>Bauhinia variegata</i> | Tree | 01 |
| 49. | Kalanchoe Pinnata | <i>Bryophyllum pinnatum</i> | Herb | 03 |

| | | | | |
|-----|--------------------------------------|---------------------------------|---------|-------|
| 50. | Kamini | <i>Murraya paniculata</i> | Shrub | 05 |
| 51. | Kaneiror Kane | <i>Cascabela thevetia</i> | Shrub | 01 |
| 52. | Kochia Grass | <i>Bassia scoparia</i> | Herb | 17 |
| 53. | Kohler Denta | | | 01 |
| 54. | Peace Lily | <i>Spathiphyllum</i> | Herb | Hedge |
| 55. | Koyaliya | | | Hedge |
| 56. | Lalpatti | <i>Iresineherbstii</i> | Shrub | 01 |
| 57. | Lily | <i>Lilium</i> | Herb | 01 |
| 58. | Mango | <i>Mangifera indica</i> | Tree | 02 |
| 59. | Marigold | <i>Tagetes minuta</i> | Tree | 22 |
| 60. | Money Plant | <i>Epipremnum aureum</i> | Climber | 01 |
| 61. | Monstera Plant | <i>Monstera deliciosa</i> | Shrub | 02 |
| 62. | Morpankhi | <i>Platycladus orientalis</i> | Tree | 05 |
| 63. | Moulsari Tree | <i>Mimusops elengi</i> | Tree | 01 |
| 64. | Naagdon | <i>Euphorbia tithymaloides</i> | shrub | 05 |
| 65. | Neem Tree | <i>Azadirachta indica</i> | Tree | 02 |
| 66. | Night-blooming jasmine (RatRani) | <i>Cestrum nocturnum</i> | Shrub | 01 |
| 67. | Night-flowering Jasmine (Parijat) | <i>Nyctanthes arbor-tristis</i> | Shrub | 02 |
| 68. | Parlour Palm | <i>Chamaedorea elegans</i> | Tree | 04 |
| 69. | Petunia | <i>Petunia</i> | Herb | 02 |
| 70. | PonytailPalm (Lolina) | <i>Beaucarnea recurvata</i> | Tree | 01 |
| 71. | Prass | | | 01 |
| 72. | Raphis Palm | <i>Rhapis excelsa</i> | Tree | 01 |
| 73. | RedHedge | | | Hedge |
| 74. | Rose | <i>Rosa rubiginosa</i> | Shrub | 02 |
| 75. | Rubberplant | <i>Ficus elastica</i> | Tree | 01 |
| 76. | Sadabahar | <i>Catharanthus roseus</i> | Shrub | 02 |
| 77. | ShirishaTree | <i>Albizia nedbeck</i> | Tree | 02 |
| 78. | Sleeping Hibiscus/ Mirchi Gudhal | <i>Malvaviscus</i> | Shrub | 01 |
| 79. | Snake Plant | <i>Sansevieria trifasciata</i> | Shrub | 01 |
| 80. | Swarnachampa | <i>Magnolia champaca</i> | Tree | 01 |
| 81. | Tecoma | <i>Tecoma stans</i> | Shrub | 01 |
| 82. | Tengri | | | 04 |
| 83. | Tree Ferns | <i>Cyatheaceae</i> | Fern | 02 |
| 84. | Tulsi | <i>Ocimum tenuiflorum</i> | Herb | 02 |
| 85. | Wela | | | 03 |
| 86. | White Hibiscus | <i>Hibiscus rosa-sinensis</i> | Shrub | 01 |
| 87. | Yellow Kaner | <i>Cascabela thevetia</i> | | 01 |



Hyophorbe lagenicaulis
Bottle palm



Bougainvillea
Booganbel



Citrus limon
Lemon



Polyalthia longifolium
False Ashoka



Eucalyptus
Gum tree



Manilkara zapota
Chikoo



Platycladus orientalis
Morpankhi



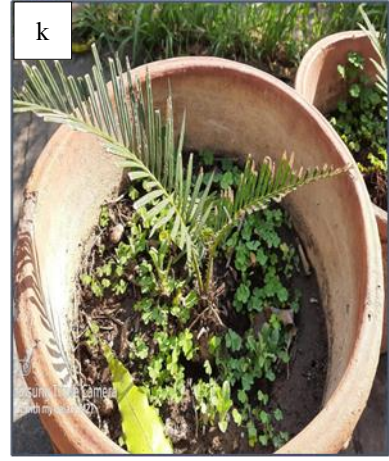
Ficus elastica
Rubber fig



Aralleotrys odoratissimus
Nag champa



Bombax ceiba
Semal



Zamia
Cycas Zamia



Liuistona chinensis
China palm



Ficus carica
Anjeer



Calliandra haematocephala
Red powder puff



Terminalia caloppa
Kaath badaam



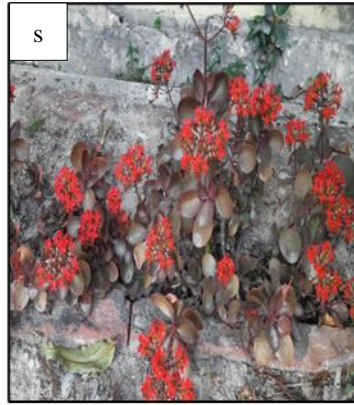
Cordia dichotoma
Lasoda



Santalum album
Chandan



Rosa
Rose



Kalanchoe pinnata
Ajooba



Murraya koenigii
Curry Leaf



Nelumbo nucifera
Kamal/Lotus



Nyctanthes arbor-tristis
Parijat/ Harsingar



Bauhinia variegata
Kachnar

Figure 14: Major flora (a-w) in the Vasant Kanya Mahavidyalaya

CONCLUSION AND RECOMMENDATIONS

Green audit “adds value” to the management approaches being taken by the college and is a way of identifying, evaluating, and managing environmental risks (both known and unknown). The green audit reports assist in the process of attaining an eco-friendly approach to the development of the college. The results presented herein shall serve as a guide for educating the college community on the existing environment related practices, judicious and apt use of resources and address the gaps in the green campus report spawning innovative practices in line with sustainable campus.

In view of the findings of the green audit team some of the recommended actions are suggested to support the management practices of VKM.

- Proper cleanliness and hygiene need to be promoted through awareness programs and hands on drill.
- Energy efficient appliances with 5–star ratings for Air Conditioners, Fans, etc. should preferably replace the conventional appliances.
- Equipments on campus need to be maintained and kept in working condition at all times.
- More signages on water conservation are needed to be put up in washrooms or near water purifiers.
- Use of bicycles and solar panels need to be promoted among students and staff to reduce carbon footprint.
- Separate waste-bins with lids should be installed for the disposal of different kinds of solid waste.

- Segregation of biodegradable and non-biodegradable wastes should be practiced on campus by students and staff for waste disposal.
- “Switch off” drills are needed in the campus to create awareness among the students for energy conservation.
- Scientific names of the plants and trees in the campus premise be displayed to portrait the college’s rich biodiversity.
- Replacement of the old tube lights with the new LED tubes will promote energy conservation.
- “Fire” drills on campus are needed to create awareness among the students in case of fire.
